Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

99-RU-0562

Mr. M. J. Lawrence, Executive Vice President
General Manager
BNFL Inc.
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Lawrence:

STANDARDS SELECTION PROCESS INSPECTION REPORT, IR-99-006

On September 7, 1999, the Office of Radiological, Nuclear, and Process Safety Regulation (Regulatory Unit) completed an inspection of the Standards Selection Process at the BNFL Inc. (BNFL) facility.

The inspectors identified one Finding, documented in the Notice of Finding (Enclosure 1). The Finding resulted from the inspectors identifying that a standards selection process-related commitment in the Safety Requirements Document (SRD) was not being properly implemented. Specifically, contrary to SRD Rev. 2, Safety Criterion 7.1-3, there was not a clear separation of responsibilities between the Project Safety Committee (PSC) and the Process Management Team such that the independence of the PSC was retained. You are requested to provide a written response to this Finding within 30 days, in accordance with the instruction provided in the enclosed Notice of Finding.

Details of the inspection, including the Finding, are documented in the enclosed inspection report (Enclosure 2).

The results of our inspection revealed that your team approach was considered a strength. However, because the standards selection process for your Integrated Safety Management
Cycle I was not complete, final results of the standards selection process including identification of standards through certification could not be effectively evaluated. Additionally, the inspectors could not verify that all items required to be in the hazard database were, or would be, recorded therein.

Nothing in this letter should be construed as changing the Contract (DE-AC06-96RL13308). If you have any questions regarding this inspection, please contact me or Pat Carier of my staff on (509) 376-3574.

Sincerely,

D. Clark Gibbs, Regulatory Official
Office of Radiological, Nuclear, and
Process Safety Regulation

RNP:NKH

Enclosures

cc w/encls:
D. W. Edwards, BNFL

NOTICE OF FINDING

Standard 4, "Safety, Health, and Environmental Program," of Contract DE-AC06-RL13308, dated August 24, 1998, between BNFL Inc. (the contractor) and the U.S. Department of Energy (DOE), defines the contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; and environmental protection.

During the performance of an inspection of the standards selection process at the offices of the contractor's Tank Waste Remediation System Privatization (TWRS-P) project, the Regulatory Unit identified the following Finding.

> SRD, Rev. 2, Safety Criterion 7.1-3 states that "The separation between the responsibilities of the safety review organizations and those of the other organizations shall remain clear so that the safety review organizations retain their independence as safety authorities." Furthermore, SRD, Rev. 2, Appendix B states, "The TWRS-P Safety Requirements Document (BNFL-5193-SRD-01), Safety Criterion 7.1-3, requires that BNFL establish a safety framework and specifies requirements for the Internal Safety Oversight program consistent with Top-Level Principle 4.4.1, "Safety Review Organization." BNFL has established a TWRS-P Project Safety Committee (PSC) to provide an independent, interdisciplinary evaluation of matters related to nuclear, radiological, and process safety."
>
> Contrary to the above, the inspectors found during the week of September 7-10, 1999, that there was not a clear separation of responsibilities between the PSC and the Process Management Team such that the independence of the PSC was retained.
>
> This is considered an inspection Finding.

The contractor is requested to provide to the Regulatory Unit within 30 days of the date of the cover letter that transmitted this Notice, a reply to the Finding described above. The reply should include: (1) agreement or disagreement with the Finding, (2) the reason for the Finding, if the contractor agrees with it, and if the contractor disagrees, the reason why, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further Findings, and (5) the date when full compliance with the applicable commitments in your authorization base will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

This page intentionally left blank.

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Office of Radiological, Nuclear, and Process Safety Regulation
of the TWRS-P Contractor

INSPECTION: STANDARDS SELECTION PROCESS ASSESSMENT

REPORT NO: IR-99-006

FACILITY: BNFL Inc.

LOCATION: 3000 George Washington Way
Richland, Washington 99352

DATES: September 7-10, 1999

INSPECTORS: N. Hunemuller (Lead), Senior Regulatory Technical Advisor
N. Kaushal, Senior Regulatory Technical Advisor
J. Boudreau, Regulatory Unit Consultant

APPROVED BY: Pat Carier, Verification and Confirmation Official
Office of Radiological, Nuclear, and Process Safety Regulation

This page intentionally left blank.

EXECUTIVE SUMMARY
Standards Selection Process Assessment
Inspection Report Number IR-99-006

INTRODUCTION

This inspection of the BNFL Inc. (the contractor) Standards Selection Process covered the following specific areas:

- Standards Process Initiation (Section 1.2)
- Identification of Work (Section 1.3)
- Hazards Evaluation (Section 1.4)
- Development of Control Strategies (Section 1.5)
- Identification of Standards (Section 1.6)
- Confirmation of Standards (Section 1.7)
- Formal Documentation (Section 1.8)
- Standards Recommendations (Section 1.9)

SIGNIFICANT OBSERVATIONS AND CONCLUSIONS

- The team approach engendered by management was evident. Interviewees indicated that the teams had a high degree of participation, that there were essentially no barriers to communication, and all worked well together to achieve consensus.

- Integrated Safety Management (ISM) Cycle I was not complete. BNFL was presently in the process of identifying important-to-safety systems, structures and components, and identifying standards. The identification of standards step was not complete for ISM Cycle I for any system. (Section 1.1)

- Appendix A to Rev. 2 of the SRD states that the Process Management Team (PMT), in addition to providing resources and resolving issues, shall oversee the identification of work, hazards evaluation, development of control strategies, and identification of standards activities. The inspectors observed that the PMT performed some but not all aspects of oversight. Based upon interviews, the inspectors determined that the PMT performed such aspects of oversight as providing leadership, direction, guidance and support. However, the PMT did not review or approve the products from the steps of the standards selection process nor verify that the requirements for performing the steps were met. (Section 1.2)

- The inspectors could not verify that all items required to be in the hazard database, in accordance with SRD, Rev. 2, Appendix A, were recorded or would be recorded in the Standards Identification Process Database (SIPD). A list of SIPD fields indicated that there would be either fields or references to retrievable information to meet the database content requirements. Verification of the addition of the necessary references or fields as

indicated in the list of proposed SIPD fields, was identified as an inspection follow-up item (IR-99-006-01-IFI). (Sections 1.4 and 1.5)

- Resolving discrepancies from the current SRD was not part of the standards selection process, i.e., ISM Cycles I & II. Discrepancies identified between the standards selected from the ISM Cycles I & II and those standards that were previously identified in the SRD Rev. 2 were not planned to be recorded in the SIPD. The mechanism available for addressing such discrepancies was the authorization basis change notice and amendment process. Interviewees indicated this process was unwieldy but acknowledged it as the required process. (Section 1.6)

- Four of the thirteen members of the Project Safety Committee (PSC) were also members of the PMT, and one of the four was also identified as a work activity expert. The PSC procedure indicated that the PMT chairman is the vice-chairman of the PSC (although it was indicated during interviews that this was to be changed). The inspectors found that there was not a clear separation of responsibilities between the PSC and the PMT such that the independence of the PSC was retained. This was considered an inspection Finding (IR-99-006-02-FIN). (Section 1.7)

- The reviewed examples of identification of work, hazards evaluation, and development of control strategies were acceptable. However, because of lack of progress in this area, final results of the standards selection process including identification of standards through certification could not be effectively evaluated. (Sections 1.6, 1.7, 1.8, and 1.9)

STANDARDS SELECTION PROCESS ASSESSMENT

Table of Contents

This page intentionally left blank.

STANDARDS SELECTION PROCESS INSPECTION REPORT

1.0 REPORT DETAILS

1.1 INTRODUCTION

The Tank Waste Remediation System Privatization (TWRS-P) project was in the design stages at the time of this inspection. The contractor (BNFL) had hired approximately 95% of the target number of staff planned to continue progress on the design phase of the project.

In accordance with the TWRS-P Contract (Contract, DE-AC06-96RL13308 between DOE and BNFL, dated August 24, 1998, Part I, Section C, Standard 4, item 2)(b)) and specifically DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*, the contractor was required to use the process described in DOE/RL-96-0004 to select standards. This requirement was reflected in the contractor's authorization basis in the Safety Requirements Document ((SRD) BNFL-5193-SRD-01, Rev. 2), Appendix A, "Implementing Standard for Safety Standards and Requirements Identification."

The contractor was in a stage of the standards selection process that was identified as "ISM Cycle I." For this Cycle, the focus was on process flow diagrams (PFDs) for work identification. The contractor was in the process of identifying important-to-safety systems, structures, and components, and identifying standards. The identification of standards step was not complete for Cycle I for any system. The contractor planned to complete Cycle I by the end of September 1999.

The inspectors reviewed the contractor's standards selection process implementing procedures to determine if they complied with the commitments in the SRD. In addition, the inspectors assessed the implementation of the contractor's standards selection process as it related to the design phase of the TWRS-P Contract to ensure that the contractor was following its plans and procedures.

1.2 STANDARDS PROCESS INITIATION (INSPECTION TECHNICAL PROCEDURE (ITP) I-105)

1.2.1 Inspection Scope

The inspectors assessed the contractor's assignment of staff to the safety requirements and standards identification Process Management Team (PMT) and their responsibilities.

1.2.2 Observations and Assessments

The inspectors verified that the contractor had assigned appropriate staff to the PMT in accordance with the SRD, Appendix A, Section 2.0. The PMT consisted of the following TWRS-P personnel:

- Safety and Regulatory Programs Manager (PMT Chairman)
- Safety Process Manager
- Design Safety Implementation Manager
- High-Level Waste (HLW) and Low Activity Waste (LAW) Vitrification Project Design Managers
- Balance of Facility (BOF) and Pretreatment Project Design Managers
- Engineering Manager
- Operational Safety Manager

The PMT was described during interviews as the owner of the standards selection process. Although the PMT did not have a specific charter or procedure, PMT members interviewed variously indicated that the PMT was responsible for:

- monitoring the process
- looking at the process, not the products
- resolving issues
- getting involved when there was a perceived problem with the process
- ensuring appropriate resources
- giving guidance on how the process was implemented
- enabling the standards selection process
- providing integrated leadership of the process
- ensuring the process works
- providing direction and support.

One interviewee indicated that once the standards selection process was running smoothly, there would no longer be a need for the PMT.

Appendix A to Rev. 2 of the SRD state that the PMT, in addition to providing resources and resolving issues, shall oversee the identification of work, hazards evaluation, development of control strategies, and identification of standards activities. The inspectors observed that the PMT performed some but not all aspects of oversight. Based upon interviews, the inspectors determined that the PMT performed such aspects of oversight as providing leadership, direction, guidance, and support. However, the PMT did not review or approve the products from the steps of the standards selection process, nor verify that the requirements for performing the steps were met. The following examples were cited during interviews:

- The PMT did not approve the data in the Standards Identification Process Database (SIPD).

- The identification of work step went well, so the PMT did not discuss it.

- In the selection of the commissioning standard, the PMT did not approve the specific standards identification team nor did any members of the PMT participate in the standards identification team's activities. There was informal feedback to and from the PMT but no approval and no formal documentation.

- The PMT did not formally review the steps as they occurred.

1.2.3 Conclusions

The inspectors verified that the contractor had assigned appropriate staff to the PMT. The inspectors observed that the PMT performed some, but not all, aspects of oversight of the standards selection process.

1.3 IDENTIFICATION OF WORK (ITP I-105)

1.3.1 Inspection Scope

The inspectors assessed the step in the standards identification process involving identifying and documenting the work that the contractor needs to perform. The inspectors assessed whether or not the identification of work was performed by work activity experts (WAEs) who were integrally associated with the facility design, had extensive knowledge of the overall processing approach, and were knowledgeable of the processes that must be performed.

1.3.2 Observations and Assessments

The inspectors reviewed the contractor's SRD (Appendix A and B), the BNFL Design Guide for Integrated Safety Management Cycles I & II (K70DG528_A), workbooks, and the SIPD, each of which addressed identification-of-work. The workbooks included documentation related to each of the eight "essential steps" of the DOE/RL-96-0004 process as well as records related to the identification of work (internal memos, process flow diagrams, etc.). Identification of work was conducted on a "system" level during the "ISM Cycle I" process.

The inspectors reviewed a list of the WAEs. The list comprised 136 individuals with the titles Associate Engineer, Engineer, Lead Engineer, Process Engineer, Process Leader, Senior Engineer, Commissioning Preparations Manager, In-Cell Mechanical/Remote Maintenance Leader, Out-Cell Mechanical/Remote Maintenance Leader, Project Coordinator (Operations), and Senior Engineering Specialist. The inspectors verified that WAEs were integrally associated with facility design, had extensive knowledge of the overall processing approach, and were knowledgeable of the processes that must be performed. The inspectors observed that WAEs were drawn from the following
TWRS-P organizations:

- Functional staff of the TWRS-P Engineering Manager
- Technical staff of the HLW and LAW Vitrification Project Design Managers
- Technical staff of the BOF and Pretreatment Project Design Managers

The identification of work for all major systems was documented in workbooks. Integrated teams of WAEs were selected for the identification of work for each major system in the facility. Integrated teams comprised of approximately six individuals each and representing at least the safety, operations, and engineering organizations were divided into three areas: HLW Vitrification, LAW Vitrification, and Pretreatment/Balance of Facility. These three areas of the facility encompassed 35 major systems. Safety Implementation Note (SIN) cover sheets were

attached to each identification-of-work record. These SIN cover sheets identified the WAEs by name and organization, and referenced specific Integrated Team meeting minutes. A summary of the material in each workbook was planned to be included in the SIPD. The workbooks were kept current by adding material as new information arose. Drawings reflecting the current Process Flow Diagrams (PFDs) were under configuration control and were labeled Rev. 0, B. When ISM Cycle I is completed (estimated to be the end of September), Revision 1 was planned to be issued.

The inspectors reviewed the identification-of-work products for the following four areas:

- HLW Vitrification Feed Area (HV Area 100)
- LAW Melter (LV Area 100)
- Cs/Tc Ion Exchange and Acid Recovery
- LAW Product Container Handling

The above four areas were the only areas for which identification-of-work products were available for review at the time of the inspection. The inspectors were unable to observe an Integrated Team meeting, as none were scheduled during the week of the inspection. In the meeting record for a July 15, 1999, Project Safety Committee (PSC) meeting, the Design Safety Implementation Manager was assigned an action to invite the RU to the meetings as observers.

The SIN cover sheets indicated that the Integrated Teams associated with each of the areas reviewed included representatives from the safety, design, and operations organizations. While TWRS-P position descriptions did not explicitly describe the responsibilities of individuals in the standards selection process (e.g., WAE, Hazards Assessment Expert [HAE], Hazards Control Expert [HCE], etc.), the inspectors determined through interviews that the participants in the identification-of-work step were well informed of their responsibilities within the process. The inspectors confirmed that the WAEs were integrally associated with the facility design, had extensive knowledge of the overall processing approach, and were knowledgeable of the processes that must be performed. One interviewee indicated that participants in the standards selection process found that it added value to project. In addition, the inspectors found that SIN adequately documented the ISM Cycle I meeting minutes.

For example, SIN-W375-990024, associated with Cs/Tc & Acid Recovery, documented a meeting in which the identification of work was performed in accordance with BNFL's Design Guide for Integrated Safety Management Cycles I & II (K70DG528). This Design Guide met the requirements of Essential Process Step 2, identification of work, of DOE/RL-96-0004. However, the inspectors noted that the identification-of-work step had only been completed at the major "system" level. Identification of work at a more detailed level (e.g., support systems, piping and instrumentation details, etc.) was planned to be completed during ISM Cycle II.

Appendix A of the SRD requires that functions, processes, and parameters be selected using trade-off studies. The contractor had not completed such trade-off studies as part of ISM Cycle I, but planned to do so for ISM Cycle II. Likewise, SRD Appendix A, Section 3, required that the contractor use an iterative approach (as necessary) when performing the identification-of-work step. While the inspectors noted some evidence of iteration in the workbooks (e.g., tailoring of the level of defense in depth for the relatively low radionuclide concentrations in the LAW facility), more extensive iteration was planned for ISM Cycle II.

During the Entrance Meeting, the contractor presented the objectives, approach, and status of the standards selection process. The contractor informed the RU that the identification-of-work step had only been completed at the major system level. The contractor also stated that while functional requirements had been defined at a qualitative level, quantitative information was needed in order for designers to select specific implementing standards. The inspectors also determined from interviews, that the contractor had not yet extensively used an iterative process when performing the identification-of-work step and that there were various levels of closure on the design iteration process for each system.

1.3.3 Conclusions

The inspectors concluded that the identification-of-work activity was adequately executed for the present stage of the project. The inspectors verified that identification of work was performed by work activity experts who were integrally associated with the facility design, had extensive knowledge of the overall processing approach, and were knowledgeable of the processes that must be performed. The inspectors observed that Work Activity Experts were drawn from the appropriate TWRS-P organization.

1.4 HAZARDS EVALUATION (ITP I-105)

1.4.1 Inspection Scope

The inspectors assessed whether or not the contractor's hazards evaluation process included the elements defined in the SRD, Appendix A, Section 4.0. The inspectors assessed the methodologies and guidelines used to perform an examination of the systems or components to identify potential accidents, including common-mode and common-cause failures. The inspectors assessed whether or not the severity levels estimated early in the design process conformed to the estimated radiological consequences provided in the SRD, Appendix A, Section 4.3.1. The inspectors assessed whether or not an initial set of potential hazards controls had been identified to manage each potential hazard.

1.4.2 Observations and Assessments

The inspectors reviewed the contractor's procedures that addressed hazards evaluation. The inspectors also reviewed and discussed the material provided by the contractor including the workbook for Cs/Tc Ion Exchange and Acid Recovery systems. The inspectors reviewed in detail the in-progress record of the contractor's work on hazards evaluation for one of the systems (Technetium Nitric Acid Recover, Cs/Tc Concentrate Storage Tank – V24007). The inspectors made the following observations.

The contractor's procedure was consistent with Appendix A to the SRD. A hazard evaluation team including work activity experts, hazard assessment experts, and hazard control experts, was properly assembled and conducted the hazard evaluation activity. Hazard assessment experts and hazard control experts were members of the technical staffs of the Design Safety Implementation Manager and of the Safety Process Manager. The PMT provided additional technical resources as required to evaluate the hazards. The PMT was available to resolve issues

raised by the hazard evaluation team. The hazard evaluation team addressed hazards inherent in normal operation as well as potential accidents resulting from abnormal internal and external events. The methodology for hazard evaluation used by the team was consistent with the methodology provided in American Institute of Chemical Engineering (AIChE), *Guidelines for Hazard Evaluation Procedures*, (1992).

The hazard evaluation did not comprise all the elements required by the SRD. The following elements had been adequately completed for the present stage of the project:

- Identification of Hazards
- Estimation of Accident Consequences
- Documentation
- Identification of Potential Control Strategies

The following elements had not been completed:

- Identification of Potential Accident/Event Sequences
- Estimation of Accident Frequencies
- Consideration of Common Cause and Common Mode Failures
- Definition of Design Basis Events
- Definition of Operating Environment
- Compilation of a list of hazardous materials and energy sources associated with the facility processes, design, and operations.

A severity level, SL, was assigned to each postulated radiological accident and reflected the unmitigated consequences of the postulated accident. Unmitigated consequences accounted for the quantity, forms and location of the radioactive material available for release, and the energy sources available to interact with the hazardous material. Unmitigated consequences did not take account of SSCs that serve to prevent or mitigate the release. Unmitigated consequences were evaluated based on a ground level release. Postulated internal events were grouped by type as required, and the accident analysis addressed the most severe credible event of each type.

The hazard evaluation work had not progressed to the point that the inspectors could evaluate the SSCs that would implement the control strategies. The hazard evaluation team defined a set of bounding operating conditions in which SSCs relied upon to control hazards must function. The hazard evaluation team also identified an initial set of potential hazard controls to manage each potential accident. This set of potential hazard controls addressed means of preventing the potential accident and addressed means of mitigating the consequences of the accident. Potential hazard controls were identified to manage accident conditions resulting from upsets in the process conditions arising from external events, and conditions inherent in the normal operation of the process.

The results of the hazard evaluation were included in a hazard database (i.e., SIPD). For each hazard considered, the hazard database included the following information produced by the hazard evaluation:

- Hazard identifier

- Hazard description
- Initiators
- Hazard severity level estimate (based on unmitigated consequences)
- Assumptions affecting the release (material at risk, energy available, etc)
- Hazard frequency estimate
- Potential controls and functions
- References for the hazard (these would typically be products of the work identification process)

The inspectors could not verify that all items required to be in the hazard database in accordance with SRD, Rev. 2, Appendix A, were recorded or would be recorded in the SIPD. A list of SIPD fields indicated that there would be either fields or references to retrievable information to meet the database content requirements. For example, the following information was not included in the database directly but the database included (or the contractor planned to include) references to hardcopy documents that contained this information.

- Severity level basis
- Basis for frequency estimate

The inspectors considered this acceptable implementation of the requirements for the present stage of the project. Verification of the addition of the necessary references or fields as indicated in the list of proposed SIPD fields was identified as an inspection follow-up item (IR-99-006-01-IFI).

1.4.3 Conclusions

The inspectors verified that the contractor's hazards evaluation process included the elements defined in the SRD, Appendix A, Section 4.0 to the extent that the process had been carried out. The inspectors verified the methodologies and guidelines used to perform an examination of the systems or components to identify potential accidents met the applicable guidelines. The inspectors verified that the severity levels estimated early in the design process conformed to the estimated radiological consequences provided in the SRD, Appendix A, Section 4.3.1. However, confirmation of the severity levels based on design progress could not be verified, as this part of the work had not been completed. The inspectors verified that an initial set of potential hazards controls had been identified to manage each hazard.

1.5 DEVELOPMENT OF CONTROL STRATEGIES (ITP I-105)

1.5.1 Inspection Scope

The inspectors assessed the hazards control strategy documentation in both workbooks and in the SIPD to determine if it provided the bases for the strategies identified and to determine if development of control strategies conformed to the requirements of the SRD, Appendix A, Section 5.0. The inspectors assessed whether or not the control strategies conformed to the requirements defined in the implementing standard for defense in depth. The inspectors assessed whether or not the structures, systems, and components (SSCs) used in control strategies for

Severity Level (SL) –1 and –2 (event frequencies of $<1x10^{-6}$ and $<1x10^{-4}$ per year, respectively) events satisfied the single-failure criteria. The inspectors examined definition of hazard control strategies for one system (Technetium Nitric Acid Recover, Cs/Tc Concentrate Storage Tank – V24007) in detail.

1.5.2 Observations and Assessments

The inspectors were briefed by the Safety Engineer responsible for implementing the SIPD and given a demonstration of its features. At the time of the inspection, SIPD supported over 50 fields comprising records related to:

- Hazards
- Control Strategy Development (CSD) Records [Hazard Scenarios]
- Documents
- Safety Case Requirement Records
- SSCs
- Standards
- Operational Parameters

The inspectors reviewed the SIPD Procedure (K71P508-0) in comparison with four Control Strategy Development Reports (from SIPD) and associated Engineering Schedules. Since the database was evolving and growing, there was not an exact match between the description of the database in the procedure and the content that the inspectors observed at the time of the inspection. For example, records related to "Documents", "SSCs, and "Operational Parameters" were observed but not described in the procedures. Nonetheless, the inspectors found that the essential features of the SIPD were consistent with the Procedure. Based on the briefing and demonstration, the inspectors observed that:

- The SIPD was not required to track the relationship between new standards developed through execution of the ISM Cycles I & II and those defined in SRD Rev. 2.

- The SIPD did not include operational information that was generated during Hazard and Operability Study (HAZOP). Such "operational parameters" were captured in meeting records that were included in workbooks.

- Safety requirements and assumptions for a given SSC were entered, linked and provided to designers. The database could be queried to enable safety and design engineers to examine trade-off considerations in the design.

The inspectors determined that workbooks included tracking of both Part A Hazard Analysis Report and Part B-1 Design Safety Features action items arising from past RU reviews. The inspectors observed that ISM Cycle I work did not include a detailed evaluation of requirements related to either defense in depth or design basis events. Similarly, conformance to the rest of the Top-Level Safety Standards and Principles had not been examined as part of the ISM Cycle I effort. Finally, only unmitigated accident consequences have been evaluated in the ISM Cycle I work.

Based upon interviews, the inspectors ascertained that defense in depth was only considered at a high level, including the number of barriers required for a given severity level as well as whether the single failure criterion was required to be met. As mentioned in relation to the identification-of-work step (see Section 1.3.2, above), studies had not yet been performed to examine trade-off considerations amongst alternative hazard control strategies. Finally, the preferred control strategy was included in the SIPD in varying levels of detail depending on the system in question. The inspectors observed that the rationale for selection of the preferred control strategy was not documented in workbooks or in the SIPD. The addition of references or fields to SIPD for documenting the rationale for the preferred control strategy selection is included in the previously identified inspection follow-up item (IR-99-006-01-IFI).

In a detailed evaluation, the inspectors examined the status of the development of hazard control strategies for the Technetium Nitric Acid Recovery, Cs/Tc Concentrate Storage Tank – V24007, as documented in the workbooks and the SIPD. The inspectors observed the following:

- The rationale for the selection of the preferred control strategy was not documented.

- In ISM Cycle I, the contractor determined accident severity levels for all major systems from qualitative estimates of unmitigated consequences. More detailed analysis of mitigated accident consequences and estimation of unmitigated and mitigated accident frequencies was planned to be performed for ISM Cycle II.

- Reliability of preferred hazard control strategies was not documented.

- There was limited documentation of the approach to hazard control in the SIPD. Only the preferred control strategy and related functions and performance requirements were documented in the SIPD. In most instances, documentation included the related important-to-safety SSCs, safety functions, safety design requirements, and design safety features.

- The approach to defense in depth had not been documented in ISM Cycle I. The manner in which related requirements were met, such as the single failure criterion, were also not yet documented. The remaining detailed set of SRD. Rev. 2, Appendix B (defense in depth) requirements were therefore not reviewed by the inspectors.

- The approach to meeting target frequency and the degree of mitigation had not been documented in ISM Cycle I.

1.5.3 Conclusions

The inspectors concluded that the hazards control strategy documentation (workbooks and the SIPD) provided an adequate preliminary basis for the control strategies identified and conformed to the guidance provided in the SRD, Appendix A, Section 5.0.

However, the inspectors were unable to verify that the control strategies conformed to the requirements defined in the implementing standard for defense in depth because BNFL had not yet addressed defense in depth in ISM Cycle I. Also, the inspectors were unable to verify that

the structures, systems, and components (SSC) used in control strategies for Severity Level (SL) –1 and –2 events (event frequencies of $<1x10^{-6}$ and $<1x10^{-4}$ per year, respectively) satisfied the single-failure criteria because ISM Cycle I had not yet documented this information.

Finally, the contractor had not yet documented operational parameters, the rationale for the preferred control strategy, trade-off considerations, mitigated accident consequences, unmitigated and mitigated accident frequencies, reliability of the preferred control strategy, or applicable design basis events.

1.6 IDENTIFICATION OF STANDARDS (ITP I-105)

1.6.1 Inspection Scope

The inspectors assessed whether or not the contractor's standards selection process was an iterative activity and if the implementation of the standards selected was tailored to better fit the hazards as the design evolved. The inspectors assessed the documentation of the linkages from the hazards identified, to the control strategies, to the standards identified.

1.6.2 Observations and Assessments

As stated in Section 1.3 of this inspection report, the inspectors noted some evidence of iteration and tailoring in the contractor's process and that more extensive iteration was planned for ISM Cycle II. However, the identification-of-standards step was not complete for ISM Cycle I for any system. Therefore, the inspectors could not effectively evaluate this step of the process.

The inspectors observed that the SIPD was the mechanism used for documentation of the linkages from the hazards identified, to the control strategies, to the standards identified. However, identified standards were not yet included. Records for standards were planned to be included in the SIPD in accordance with the list of proposed SIPD fields, and verification of the addition of the necessary references or fields was included in the inspection follow-up item (IR-99-006-01-IFI).

The inspectors also observed that resolving discrepancies from the current SRD was not part of the standards selection process, i.e., ISM Cycles I & II. Discrepancies identified between the standards selected from the ISM Cycles I & II and those standards that were previously identified in the SRD Rev. 2 were not planned to be recorded in the SIPD. The mechanism available for addressing such discrepancies was the authorization basis change notice and amendment process. Interviewees indicated this process was unwieldy but acknowledged it as the required process.

1.6.3 Conclusions

The inspectors determined that, although there was some evidence that the standards selection process was an iterative activity, there were no results from the identification-of-standards step for ISM Cycle I. Therefore, the inspectors could not effectively evaluate this step of the process.

The inspectors observed that the SIPD was not yet fully developed and that no records for the standards identified were yet included. The inspectors also observed that resolving discrepancies from the current SRD was not part of the standards selection process, i.e., ISM Cycles I & II.

1.7 CONFIRMATION OF STANDARDS (ITP I-105)

1.7.1 Inspection Scope

The inspectors assessed the confirmation of the selected set of standards by the contractor's PSC. The inspectors assessed whether or not the confirmation of standards was based on a defined and documented review approach. The inspectors assessed whether or not the confirmation of standards was appropriately documented and if comments from the PSC were formally dispositioned by the PMT.

1.7.2 Observations and Assessments

The inspectors observed that the contractor's standards selection process for ISM Cycle I had not progressed to the confirmation-of-standards step. Thus, the inspectors were not able to effectively evaluate this step of the process for ISM Cycle I. However, in information provided prior to the inspection, the contractor identified that there were two modifications to the existing set of RU-approved standards: (1) identification of the implementing standard for commissioning, and (2) revision to the implementing standard for configuration control. The inspectors ascertained from interviews that the commissioning standard was scheduled to be reviewed by the PSC in the near future. The information provided prior to the inspection also indicated that, at the time of the inspection, there had been no comments generated by the PSC to be dispositioned by the PMT.

The inspectors reviewed the PSC procedure, K70P526A_1. The objective of the procedure stated, in part,

> "The TWRS-P PSC is a multidisciplinary, independent advisory committee to the General Manager and Project Manager on matters related to nuclear, radiological, process, and occupational safety; and environmental protection."

Additionally, one of the PSC membership requirements stated in the procedure was that:

> "The PSC member shall not normally be a direct participant in the preparation of the material to be reviewed. (This does not exclude management PSC members from presenting project materials prepared by staff personnel within their organization. The influence of any single individual is balanced by the committee review process.)"

Based upon interviews, the inspectors observed that PSC members also believed that the team approach offered safeguards against potential lack of independence because an individual's opinion was not likely to have undue influence on the decisionmaking of the team. However, two interviewees expressed the possible need for additional independence and the possible need to include provisions for recusal in the procedure.

SRD, Rev. 2, Safety Criterion 7.1-3 stated that "The separation between the responsibilities of the safety review organizations and those of the other organizations shall remain clear so that the safety review organizations retain their independence as safety authorities." Furthermore, SRD, Rev. 2, Appendix B states, "The TWRS-P Safety Requirements Document (BNFL-5193-SRD-01), Safety Criterion 7.1-3, requires that BNFL establish a safety framework and specifies requirements for the Internal Safety Oversight program consistent with Top-Level Principle 4.4.1, "Safety Review Organization." BNFL has established a TWRS-P Project Safety Committee (PSC) to provide an independent, interdisciplinary evaluation of matters related to nuclear, radiological, and process safety."

The inspectors observed that four of the thirteen members of the PSC were also members of the PMT, and one of the four was also identified as a work activity expert. The PSC procedure indicated that the PMT chairman was the vice-chairman of the PSC (although it was indicated during interviews that this was to be changed). Based upon the above, the inspectors found that there was not a clear separation of responsibilities between the PSC and the PMT such that the independence of the PSC was retained. This was considered an inspection Finding (IR-99-006-02-FIN).

1.7.3 Conclusions

The inspectors could not effectively evaluate the outcome of the confirmation-of-standards step of the process for ISM Cycle I because there were no results to review. However, based upon procedure review, interviews and observations, the inspectors found that there was not a clear separation of responsibilities between the PSC and the PMT such that the independence of the PSC was retained. This was considered an inspection Finding (IR-99-006-02-FIN).

1.8 FORMAL DOCUMENTATION (ITP I-105)

1.8.1 Inspection Scope

The inspectors assessed whether or not the results of the standards selection process were appropriately documented in the SRD. The inspectors assessed whether or not the SRD appropriately identified and justified the set of requirements and standards selected to provide adequate protection for workers, the public, and the environment.

1.8.2 Observations and Assessments

The inspectors observed that the contractor's standards selection process for ISM Cycle I had not progressed to the formal documentation step. Thus, the inspectors were not able to effectively evaluate this step of the process for ISM Cycle I.

1.8.3 Conclusions

The inspectors could not effectively evaluate this step of the process because there were no results to review.

1.9 STANDARDS RECOMMENDATIONS (ITP I-105)

1.9.1 Inspection Scope

The inspectors assessed whether or not the contractor had certified that the recommended set of standards, when properly implemented, provided adequate safety, complied with applicable laws and regulations, and conformed with DOE/RL-96-0006.

1.9.2 Observations and Assessments

The inspectors observed that the contractor's standards selection process for ISM Cycle I had not progressed to the recommendations step. Thus, the inspectors were not able to effectively evaluate this step of the process for ISM Cycle I.

1.9.3 Conclusions

The inspectors could not effectively evaluate this step of the process because there were no results to review.

2.0 EXIT MEETING SUMMARY

The inspectors presented the inspection results to members of contractor management at an exit meeting on September 10, 1999. The contractor acknowledged the Observations, Conclusions, and Finding presented. With respect to the Finding, the contractor commented that the contractor believed sufficient independence could be retained with some PMT members on the PSC. Additionally, the contractor noted that PSC members were purposefully selected to represent a variety of the contractor's staff organizations.

The inspectors asked the contractor whether any materials examined during the inspection should be considered proprietary information. The contractor stated that the documents reviewed by the inspectors that were marked "proprietary" plus the system descriptions for HLW Vitrification, Offgas, and the LAW Melter Feed System were considered proprietary. None of the material considered proprietary is contained in this inspection report.

3.0 REPORT BACKGROUND INFORMATION

3.1 PARTIAL LIST OF PERSONS CONTACTED

J. Hammond, Design Safety Implementation Manager
M. O'Connor, Safety Engineer (Inspection liaison)
S. Sharpe, Commissioning Preparations Manager
I. Wheeler, Operational Safety Manager
D. Edwards, Safety and Regulatory Programs Manager
A. Larson, Deputy Design Safety Implementation Manager
I. Younger, Safety Engineer
S. Sontag, Safety Engineer
S. Lilley, Safety Engineer
C. Younger, Safety Process Manager

3.2 LIST OF INSPECTION PROCEDURES USED

Inspection Technical Procedure I-105, "Standards Selection Process Assessment"

3.3 LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

IR-99-006-01-IFI	Follow-up Item	Verification of the addition of the necessary references or fields as indicated in the list of proposed SIPD fields
IR-99-006-02-FIN	Finding	There was not a clear separation of responsibilities between the PSC and the PMT such that the independence of the PSC was retained.

Closed

None

3.4 KEY DOCUMENTS REVIEWED

Contractor Procedures

- K70C514_0B: "Code of Practice for Development of Hazard Control Strategies and Identification of Standards," dated August 1999
- K70G502_C: "Guide for Standards Identification Process Database," dated September 1999

- K71C502_0: “Code of Practice for Revisions to the Safety Requirements Document,” dated November 1998
- K71P505A_0: “Safety Standards and Requirements Identification,” dated May 1999
- K71P508_0: “Standards Identification Process Database,” dated September 1999
- K70DG528_A: “Design Guide for Integrated Safety Management Cycles I & II,” dated June 1999
- K70P526A_1: “Project Safety Committee,” dated July 1999

Management Self-Assessments

- Self Assessment Record SA-W375-99-00189, Rev. 0, Activity Reference JBH/99/001, dated August 31, 1999
- Self Assessment Record SA-W375-99-00202, Rev. 0, Activity Reference JBH/99/001, dated September 7, 1999
- Self Assessment Record SA-W375-99-00201, Rev. 0, Activity Reference JBH/99/002, dated August 31, 1999
- Memorandum, to Don Edwards from John Hammond, “Update of self assessment SA-W375-99-00152,” dated September 7, 1999, CCN # 006023
- Self Assessment Record SA-W375-00024, Rev. 0, Activity Reference DWE/99/005, dated April 28, 1999

Surveillance Reports

- Surveillance Report SV-W375-QA00011; Standard Selection Process, dated August 31, 1999

Other

- Safety Implementation Note SIN-W375-99-00031, “Identification of Implementing Standard for Commissioning,” dated July 26, 1999
- Process Management Team Meeting Minutes from August 18, 1999 meeting
- Process Management Team Meeting Minutes from August 27, 1999 meeting
- Project Safety Committee Meeting Minutes from October 30, 1998 meeting
- Project Safety Committee Meeting Minutes from March 10, 1999 meeting

- Project Safety Committee Meeting Minutes from June 10, 1999 meeting
- Project Safety Committee Meeting Minutes from July 15, 1999 meeting
- Design Committee Meeting Minutes from August 2, 1999 meeting
- Deficiency Report DR-W375-99-QA-00082 (Rev. 0): "The standard selection process is not fully implemented as documented in the Safety Requirements Document (SRD) and project implementing procedures."
- Deficiency Report DR-W375-99-QA-00083 (Rev. 0): "The standard selection process activities are not performed as documented in the Safety Requirements Document (SRD) and project implementing procedures."
- Deficiency Report DR-W375-99-QA-00084 (Rev. 0): "The Configuration Management program is not fully implemented as committed to in the QAP Implementation Matrix."
- Deficiency Report DR-W375-99-QA-00085 (Rev. 0): "Broad access to consensus codes and standards required for design are not available to the project. No central or project specific library of applicable codes and standards exist."
- Control Strategy Development Report, Situation Reference CSD-P340/0111, "Worker in proximity to vessel containing highly radioactive material due to human error," dated September 2, 1999
- Control Strategy Development Report, Situation Reference CSD-P340/0115, "Leak into cooling coil due to a) corrosion, b) weld failure, c) erosion," dated September 2, 1999
- Control Strategy Development Report, Situation Reference CSD-L100/0008, "Pin hole leak(s) in pressurized process piping, vessels due to corrosion/erosion," dated September 7, 1999
- Control Strategy Development Report, Situation Reference CSD-L310/0004, "Uncontrolled lowering/drop of container onto container handling area floor," dated September 1, 1999
- Control Strategy Development Report, Situation Reference CSD-H100/00025, "Loss of cell ventilation," dated September 2, 1999
- Control Strategy Development Report, Situation Reference CSD-H100/0013, "Excessive direct radiation from cave into operating area due to shielding failure, excessive source term, contamination buildup . . .," dated September 2, 1999

4.0 LIST OF ACRONYMS

BNFL	BNFL Inc.
BOF	Balance of Facility
CFR	Code of Federal Regulations
CSD	Control Strategy Development
DOE	U.S. Department of Energy
DR	Deficiency Report
HAE	Hazards Assessment Expert
HAZOP	Hazard and Operability Study
HCE	Hazards Control Expert
HLW	High Level Waste
ISM	Integrated Safety Management
ITP	Inspection Technical Procedure
LAW	Low Activity Waste
PD	Position Description
PFD	Process Flow Diagram
PMT	Process Management Team
PSC	Project Safety Committee
QAP	Quality Assurance Program
RL	Richland Operations Office
RU	Regulatory Unit
SIN	Safety Implementation Note
SIPD	Standards Identification Process Database
SL	Severity Level
SRD	Safety Requirements Document
SSC	structure, systems, and components
TWRS-P	Tank Waste Remediation System Privatization
WAE	Work Activity Expert

This page intentionally left blank.